



CASH WAGGNER
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APPROVED

OCT 06 2015

VANDERBURGH COUNTY
 DRAINAGE BOARD 8-21-15

August 21, 2015

Mr. Jeff Mueller
 Vanderburgh County Surveyor
 Room 325 Civic Center - 1 NW Martin Luther King Jr. Blvd.
 Evansville, IN 47708

**RE: Final Drainage Report
 Family Bible Church
 15515 Husky Way
 Our Project #: 15-2122**



Mr. Mueller:

Below is a summary of the drainage calculations for the above-referenced project.

SITE DESCRIPTION

This development consists of a single structure to serve as a church and its associated improvements (i.e. access drive, parking lot, utilities). This project will be constructed in one phase with the possibility of future expansion of the building and parking. The current proposed development will disturb approximately 6 acres to facilitate construction of the building and infrastructure. The site is located on a 12.83-acre parcel that lies approximately 1400 feet east and 950 feet south of the Highway 41 and East Baseline Road intersection. The proposed structure and associated improvements, with the exception of the detention basin, will be constructed on the west side of the parcel, adjacent to the Husky Way roadway.

No regulated drains or outfalls exist on this site. A portion of the storm sewer system for the Husky Way roadway is located on the property. Five curb inlets and one manhole are located on or partially on the property. Two of the curb inlets are located near the southwest corner of the property within the roadway. The other three curb inlets and the manhole are located near the northwest corner of the property. The curb inlets are within the roadway and the manhole is east of and immediately adjacent to the roadway. Six lines of reinforced concrete pipe (RCP) of varying lengths connect the curb inlets and manholes. The storm sewer system collects runoff from the Husky Way roadway and conveys the water south away from the site. All components of the storm sewer system that are within the property boundary are located within the 60-foot right-of-way for Husky Way. No existing sanitary sewers, combined sewers or outfalls are located on this site. No known wells, septic tanks systems or outfalls exist on this site. No seeps, springs, sinkholes, caves, shafts, faults or other such geological features are visible or of record on this site.

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 SURVEYOR'S OFFICE

8/24/15 CA

7/28/2017

SOIL PROPERTIES

The Soil Survey for Vanderburgh County, Indiana, as published by the United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), and found online at <http://websoilsurvey.nrcs.usda.gov/app/>, indicates that the following soils are present on the site: Alford silt loam (AIB2), 2 to 6 percent slopes, eroded; Birds silt loam (Bd); Hosmer silt loam (HoB2), 2 to 6 percent slopes, eroded; Hosmer silt loam (HoB3), 2 to 6 percent slopes, severely eroded; Iva silt loam (Iv); and Stendal silt loam (St). According to the soil survey, the Iva silt loam units comprise just over 50 percent of the surface area. A soils map of the site is included in the Custom Soil Survey prepared from the USDA Soil Survey for Vanderburgh County.

FLOODPLAIN DATA

The project site is located on Map Number 18163C0106D of the National Flood Insurance Program's Flood Insurance Rate Maps (FIRM) for Vanderburgh County, Indiana and Incorporated Areas, dated March 17, 2011. According to the information on the FIRM panel, no portion of the site lies within the limits of the 100-year flood zone. A copy of the pertinent portion of the FIRM panel is included which depicts the location of the proposed development site.

DRAINAGE PATTERNS

The existing site was previously utilized as a cultivated field. The majority of the site drains in a north-northeasterly direction and runoff sheet flows from the property to either the existing road ditch located on the south side of E. Baseline Road or into the channel of an unnamed tributary to Pond Flat Ditch. The remaining portion (approximately 2.2 acres) drains in a west-southwesterly direction toward Husky Way and eventually to a retention basin located southwest of the property.

The site was divided into three undeveloped sub-basins; UN-1, UN-2 and UN-3. The three sub-basins are depicted on the attached sheet entitled Undeveloped Sub-Basins. UN-3 contains a portion of the existing cultivated field which will remain undisturbed but will be collected by the proposed detention basin. Sub-basins UN-1 & UN-3 drain in a northeasterly direction toward East Baseline Road, while sub-basin UN-2 drains in west-southwesterly direction toward Husky Way. Peak flow calculations for the 10-year storm event were performed for the undeveloped sub-basins. The sum of the total peak 10-year flow rate for UN-1, UN-2 and UN-3 is 16.39 cfs.

The area of the site containing the proposed development was divided into (7) seven sub-basins, which are depicted on the Developed Sub-basins Exhibit. Under developed conditions, sub-basins #1, #2, #3 and #4 are shown to contain the proposed structure, parking lot, detention basin and the majority of the access drive from Husky Way. Runoff from these four sub-basins, which contain 8.96 acres, will be conveyed to the detention basin via sheet flow or a storm sewer conduit. The detention basin was designed to contain the runoff from the 100-year storm event while releasing it at a peak discharge rate equal to the 10-year peak flow rate under undeveloped conditions. The allowable release rate for the 100-year storm from the detention basin



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(Q_{A100}) was determined by reducing the 10-year undeveloped peak by the peak flows from the undetained areas.

The undetained areas along the north perimeter of the site are comprised of sub-basins #5, #6 and #7 which total approximately 2.77 acres. Developed sub-basin #5 will consist of 0.10 acre of impervious surface (entrance drive) and a 0.67 acre lawn area, which will drain toward Husky Way. Developed sub-basin #6 will consist entirely of a 1.26 acre lawn area along the north perimeter of the site. Developed sub-basin #7 will consist entirely of lawn area, which will drain southwest toward Husky Way. The summary table below depicts the determination of the peak flow rates.

CALCULATIONS

The Rational Method and HERSICC Manual were utilized in performing the drainage calculations for this project. All storm sewers were designed to carry the 25-year developed runoff. Because the site is located within an Impacted Drainage Area of Vanderburgh County, Detention Basin #1 was designed to contain the peak 100-year developed runoff from the site while allowing a release rate less than the peak 10-year undeveloped runoff rate from the site. The emergency spillway for the detention basin was designed to pass the runoff from storm events which may exceed the 100-year storm.

Below is a summary of the detention basin design elements:

Description		Notes
Undeveloped Q(10)	16.39 cfs	UN-1, UN-2 & UN-3
Undetained Developed Q(100)	6.31 cfs	Dev. Sub-basin #5 -#7
Total Allowable Detention Basin Release Rate (100-yr)	10.08 cfs	
Detention Basin #1		
Design Release Rate	5.96 cfs	HW = 1.39 ft.
Primary Spillway I.E.	451.00 ft.	15" HDPE
Emergency Spillway I.E.	452.50 ft.	Open-channel: 10' bottom, 4:1 ss
Total Developed Inflow (Q100)	21.29 cfs	Sub-basins #1, #2, #3 & #4
10/100-yr. Req'd Volume	16,395 cu. ft.	
100-year Storage Vol. Elev.	452.39 ft.	HW = 1.39 ft.
Minimum Top/Berm	453.00 ft.	

Maintenance of Drainage System



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The following language addressing maintenance requirements for the drainage management system, including inlets, storm sewers, and the detention basin and its' appurtenant structures, will be included on the final plat. Post-construction maintenance requirements for the detention basin are depicted in Part C, Section C5, of the SWP3 Narrative.

The property owner(s) shall be responsible, including financially, for maintaining the storm water management system and any associated drainage easements which exist on their property in proper working order, including:

1. Mowing grass, controlling weeds, and maintaining the designed cover of waterways, storage basins, and easements in accordance with all applicable ordinances.
2. Keeping all parts of the storm water system operating as designed and as constructed and free of trash, debris, and obstructions to the flow of water.
3. Keeping the channels, embankments, shorelines, and bottoms of waterways and basins free from erosion and sedimentation.
4. Maintaining that part of the storm water system which lies on his or her property in accordance with the conditions described on the approved drainage plan on file in the County Surveyor's Office.
5. Alteration of the land within a storm water drainage easement in this subdivision requires approval of the County Drainage Board.

Appropriate drainage easements will be provided for the storm sewer system components and the detention basin in accordance with the requirements of the ordinance. Any required easements will be depicted on the Drainage & Grading Plan drawing (Sheet C-101). An on-site bench mark is also now shown on the Drainage & Grading Plan drawing.

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DETENTION FACILITY DESIGN VOLUME CALCULATIONS

PROJECT: **Family Bible Church** DETENTION FACILITY DESIGN RETURN PERIOD: 100 YRS

RELEASE RATE RETURN PERIOD: 10 YRS

WATERSHED AREA: **8.96 ACRES**
 DEVELOPED RUNOFF COEFFICIENT (C_d): **0.357**

STORM DURATION T _d (HRS)	RAINFALL INTENSITY I _d (INCH/HR)	INFLOW RATE I(T _d) (C _d *I _d *A) (CFS)	OUTFLOW RATE O (C _u *I _u *A) (CFS)	STORAGE RATE ΔS I(T _d)-O (CFS)	REQUIRED STORAGE S _d (I(T _d)-O)*T _d /12 (ACRE-FT)
0.08	8.469	27.09	5.96	21.13	0.147
0.17	7.126	22.79	5.96	16.83	0.234
0.25	6.194	19.81	5.96	13.85	0.289
0.33	5.665	18.12	5.96	12.16	0.338
0.42	5.137	16.43	5.96	10.47	0.364
0.50	4.608	14.74	5.96	8.78	0.366
0.58	4.284	13.70	5.96	7.74	0.376
0.67	3.960	12.67	5.96	6.71	0.373
0.75	3.636	11.63	5.96	5.67	0.354
0.83	3.311	10.59	5.96	4.63	0.322
0.92	2.987	9.56	5.96	3.60	0.275
1.00	2.663	8.52	5.96	2.56	0.213
1.25	2.444	7.82	5.96	1.86	0.193
1.50	2.224	7.11	5.96	1.15	0.144
1.75	2.005	6.41	5.96	0.45	0.066
2.00	1.785	5.71	5.96	-0.25	-0.042

PEAK STORAGE (ACRE/FT): 0.38
PEAK STORAGE (CUBIC FT): 16,395

Family Bible Church

Detention Basin #1

PROVIDED DETENTION VOLUMES

(per ACAD)

	<u>Elevation</u>	<u>Area</u> <u>(s.f.)</u>	<u>Avg. Area</u> <u>(s.f.)</u>	<u>Inc. Vol.</u> <u>(c.f.)</u>	<u>Cumulative Vol.</u> <u>(c.f.)</u>
Pool	451.00	10,390			
	452.00	12,301	11,346	11,346	11,346
E.O.S.	452.50	13,294	12,798	6,399	17,744
T.B.	453.00	14,313	13,804	6,902	24,646

Detention volume provided at Elev. 452.50 = 17,744 c.f.

Total, required 100-YR detention volume = 16,395 c.f.

100-YR Req'd detention volume provided @ Elev. = 452.39 ft.

Req'd HW= 1.39 ft.

Family Bible Church

Detention Basin #1

PROPOSED DESIGN RELEASE RATE
100-year

CALCULATIONS FOR PIPE FLOWING FULL

(Pressure Conditions)

SOLVE FOR Q

\emptyset = 1.25 FT.
h'= 1.7 IN.
h= 0.7667 FT.
Ke= 0.5
Ko= 1
n= 0.012
L= 30 FT.
HW= 1.3917 FT.

Q= 5.96 CFS

\emptyset = diameter of orifice (pipe) h= h' + \emptyset /2
Ke= entrance coefficient h'= ht. of water
Ko= outfall coefficient above orifice
n= manning's 'n' HW= h' + \emptyset
L= length of orifice (pipe)
Q= allowable release rate

Weighted c calculations for sub-basins captured by Detention Basin

DEVELOPED WEIGHTED c CALCULATIONS			
			Total Area = 8.96 Acres
Sub-basin	Area (A)	c	c x A
#1	0.53 Ac.	0.839	0.049
#2	0.55 Ac.	0.817	0.050
#3	0.21 Ac.	0.572	0.013
#4	7.68 Ac.	0.285	0.244

Weighted c = 0.357

DEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.:	1	Total Area =	22,893 S.F.		
			0.53 Acres		
Surface					
Structures	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Pavement	=	20,136 S.F.	=	0.46 Ac.	0.92 0.02
Drives	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Patios	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Sidewalks	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Lawn (0-2%)	0 S.F.	=	0.00 Ac.	0.15	0.40
Lawn (2-5%)	2,757 S.F.	=	0.06 Ac.	0.25	0.40
Lawn (5-10%)	0 S.F.	=	0.00 Ac.	0.40	0.40
Lawn (>10%)	0 S.F.	=	0.00 Ac.	0.55	0.40
Water	0 S.F.	=	0.00 Ac.	1.00	0.00
Misc.	0 S.F.	=	0.00 Ac.	0.92	0.02

Weighted c =	0.839
Weighted N =	0.066
Sheet Flow	
L =	174 Ft.
H =	2.3 Ft.
S =	0.0129 Ft./Ft.
t1 =	7.12 Minutes
	(Min. 5 minutes)
Open Channel Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.00 Ft./sec.
t2 =	0.00 Minutes
tc =	7.12 Minutes
I(10) =	6.097 In./Hr.
I(25) =	6.664 In./Hr.
I(50) =	In./Hr.
I(100) =	7.900 In./Hr.
Q(10) =	2.69 CFS
Q(25) =	2.94 CFS
Q(50) =	0.00 CFS
Q(100) =	3.48 CFS

DEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.:	2	Total Area =	23,944 S.F.		
			0.55 Acres		
Surface					
Structures	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Pavement	=	20,246 S.F.	=	0.46 Ac.	0.92 0.02
Drives	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Patios	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Sidewalks	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Lawn (0-2%)	0 S.F.	=	0.00 Ac.	0.15	0.40
Lawn (2-5%)	3,698 S.F.	=	0.08 Ac.	0.25	0.40
Lawn (5-10%)	0 S.F.	=	0.00 Ac.	0.40	0.40
Lawn (>10%)	0 S.F.	=	0.00 Ac.	0.55	0.40
Woods (>10%)	0 S.F.	=	0.00 Ac.	0.48	0.60
Water	0 S.F.	=	0.00 Ac.	1.00	0.00
Misc.	0 S.F.	=	0.00 Ac.	0.92	0.02

Weighted c =	0.817
Weighted N =	0.079
Sheet Flow	
L =	146 Ft.
H =	2.3 Ft.
S =	0.0154 Ft./Ft.
t1 =	6.85 Minutes
	(Min. 5 minutes)
Shallow Concentrated Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.05 Ft./sec.
t2 =	0.00 Minutes
	(From HEPICCC Figure 3.4.5)
tc =	6.85 Minutes
I(10) =	6.164 In./Hr.
I(25) =	6.733 In./Hr.
I(50) =	In./Hr.
I(100) =	7.972 In./Hr.
Q(10) =	2.77 CFS
Q(25) =	3.02 CFS
Q(50) =	0.00 CFS
Q(100) =	3.58 CFS

DEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.:	3	Total Area =	8,937 S.F.	
			0.21 Acres	
Surface			C	N
Structures	= 0 S.F. =	0.00 Ac.	0.92	0.02
Pavement	= 4,293 S.F. =	0.10 Ac.	0.92	0.02
Drives	= 0 S.F. =	0.00 Ac.	0.92	0.02
Patios	= 0 S.F. =	0.00 Ac.	0.92	0.02
Sidewalks	= 0 S.F. =	0.00 Ac.	0.92	0.02
Lawn (0-2%)	= 0 S.F. =	0.00 Ac.	0.15	0.40
Lawn (2-5%)	= 4,644 S.F. =	0.11 Ac.	0.25	0.40
Lawn (5-10%)	= 0 S.F. =	0.00 Ac.	0.40	0.40
Lawn (>10%)	= 0 S.F. =	0.00 Ac.	0.55	0.40
Water	= 0 S.F. =	0.00 Ac.	1.00	0.00
Misc.	= 0 S.F. =	0.00 Ac.	0.92	0.02

Weighted c =	0.572
Weighted N =	0.217
Sheet Flow	
L =	1.03 Ft.
H =	2.4 Ft.
S =	0.0233 Ft./Ft.
t1 =	8.50 Minutes (Min. 5 minutes)
Open Channel Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.00 Ft./sec.
t2 =	0.00 Minutes
tc =	8.50 Minutes
I(10) =	5.754 In./Hr.
I(25) =	6.310 In./Hr.
I(50) =	In./Hr.
I(100) =	7.529 In./Hr.
Q(10) =	0.68 CFS
Q(25) =	0.74 CFS
Q(50) =	0.00 CFS
Q(100) =	0.88 CFS

DEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.:	4	Total Area =	334,521 S.F.	
			7.68 Acres	
Surface			C	N
Structures	= 7,237 S.F. =	0.17 Ac.	0.92	0.02
Pavement	= 0 S.F. =	0.00 Ac.	0.92	0.02
Drives	= 0 S.F. =	0.00 Ac.	0.92	0.02
Patios	= 0 S.F. =	0.00 Ac.	0.92	0.02
Sidewalks	= 0 S.F. =	0.00 Ac.	0.92	0.02
Lawn (0-2%)	= 0 S.F. =	0.00 Ac.	0.15	0.40
Lawn (2-5%)	= 108,786 S.F. =	2.50 Ac.	0.25	0.40
Lawn (5-10%)	= 0 S.F. =	0.00 Ac.	0.40	0.40
Lawn (>10%)	= 4,000 S.F. =	0.09 Ac.	0.55	0.40
Cult. Field (0-2%)	= 149,250 S.F. =	3.43 Ac.	0.20	0.20
Cult. Field (2-5%)	= 54,858 S.F. =	1.26 Ac.	0.35	0.20
Water	= 10,390 S.F. =	0.24 Ac.	1.00	0.00
Misc.	= 0 S.F. =	0.00 Ac.	0.92	0.02

Weighted c =	0.285
Weighted N =	0.257
Sheet Flow	
L =	3.00 Ft.
H =	5.8 Ft.
S =	0.0193 Ft./Ft.
t1 =	15.82 Minutes (Min. 5 minutes)
Shallow Concentrated Flow	
L =	24 Ft.
H =	0.5 Ft.
S =	0.0208 Ft./Ft.
v =	2.35 Ft./sec. (From HERPICC Figure 3.4.5)
t2 =	0.17 Minutes
tc =	15.99 Minutes
I(10) =	4.430 In./Hr.
I(25) =	4.941 In./Hr.
I(50) =	In./Hr.
I(100) =	6.089 In./Hr.
Q(10) =	9.71 CFS
Q(25) =	10.83 CFS
Q(50) =	0.00 CFS
Q(100) =	13.35 CFS

DEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.:	5	Total Area =	33,694 S.F.		
			0.77 Acres		
Surface					
Structures	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Pavement	=	4,497 S.F.	=	0.10 Ac.	0.92 0.02
Drives	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Patios	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Sidewalks	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Lawn (0-2%)	0 S.F.	=	0.00 Ac.	0.15 0.40	
Lawn (2-5%)	29,197 S.F.	=	0.67 Ac.	0.25 0.40	
Lawn (5-10%)	0 S.F.	=	0.00 Ac.	0.40 0.40	
Lawn (>10%)	0 S.F.	=	0.00 Ac.	0.55 0.40	
Water	0 S.F.	=	0.00 Ac.	1.00 0.00	
Misc.	0 S.F.	=	0.00 Ac.	0.92 0.02	

Weighted c =	0.339
Weighted N =	0.349
Sheet Flow	
L =	85 Ft.
H =	4.1 Ft.
S =	0.0482 Ft./Ft.
t1 =	8.18 Minutes
	(Min. 5 minutes)
Open Channel Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.00 Ft./sec.
t2 =	0.00 Minutes
tc =	8.18 Minutes
I(10) =	5.833 In./Hr.
I(25) =	6.392 In./Hr.
I(50) =	In./Hr.
I(100) =	7.615 In./Hr.
Q(10) =	1.53 CFS
Q(25) =	1.68 CFS
Q(50) =	0.00 CFS
Q(100) =	2.00 CFS

DEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.:	6	Total Area =	54,846 S.F.		
			1.26 Acres		
Surface					
Structures	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Pavement	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Drives	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Patios	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Sidewalks	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Lawn (0-2%)	0 S.F.	=	0.00 Ac.	0.15 0.40	
Lawn (2-5%)	38,606 S.F.	=	0.89 Ac.	0.25 0.40	
Lawn (5-10%)	0 S.F.	=	0.00 Ac.	0.40 0.40	
Lawn (>10%)	16,240 S.F.	=	0.37 Ac.	0.55 0.40	
Woods (>10%)	0 S.F.	=	0.00 Ac.	0.48 0.60	
Water	0 S.F.	=	0.00 Ac.	1.00 0.00	
Misc.	0 S.F.	=	0.00 Ac.	0.92 0.02	

Weighted c =	0.339
Weighted N =	0.400
Sheet Flow	
L =	73 Ft.
H =	2.5 Ft.
S =	0.0342 Ft./Ft.
t1 =	8.79 Minutes
	(Min. 5 minutes)
Shallow Concentrated Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.05 Ft./sec.
t2 =	0.00 Minutes
tc =	8.79 Minutes
I(10) =	5.681 In./Hr.
I(25) =	6.235 In./Hr.
I(50) =	In./Hr.
I(100) =	7.451 In./Hr.
Q(10) =	2.42 CFS
Q(25) =	2.66 CFS
Q(50) =	0.00 CFS
Q(100) =	3.18 CFS

DEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.: 7

Total Area = 32,159 S.F.
0.74 Acres

Surface				C	N
Structures	=	0 S.F.	=	0.00 Ac.	0.92
Pavement	=	0 S.F.	=	0.00 Ac.	0.92
Drives	=	0 S.F.	=	0.00 Ac.	0.92
Patios	=	0 S.F.	=	0.00 Ac.	0.92
Sidewalks	=	0 S.F.	=	0.00 Ac.	0.92
Lawn (0-2	0 S.F.	=	0.00 Ac.	0.15	0.40
Lawn (2-5%)	32,159 S.F.	=	0.74 Ac.	0.25	0.40
Lawn (5-10%)	0 S.F.	=	0.00 Ac.	0.40	0.40
Lawn (>10%)	0 S.F.	=	0.00 Ac.	0.55	0.40
Water	0 S.F.	=	0.00 Ac.	1.00	0.00
Misc.	0 S.F.	=	0.00 Ac.	0.92	0.02

Weighted c =	0.250
Weighted N =	0.400
Sheet Flow	
L =	165 Ft.
H =	2.5 Ft.
S =	0.0152 Ft./Ft.
t1 =	15.56 Minutes
Open Channel Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.00 Ft./sec.
t2 =	0.00 Minutes
tc =	15.56 Minutes
I(10) =	4.467 In./Hr.
I(25) =	4.981 In./Hr.
I(50) =	In./Hr.
I(100) =	6.135 In./Hr.
Q(10) =	0.82 CFS
Q(25) =	0.92 CFS
Q(50) =	0.00 CFS
Q(100) =	1.13 CFS

(Min. 5 minutes)

UNDEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.: UN-1

Total Area = 155,682 S.F.
3.57 Acres

Surface				C	N
Structures	=	0 S.F.	=	0.00 Ac.	0.92
Drives (Asphalt)	=	0 S.F.	=	0.00 Ac.	0.92
Drives (Gravel)	=	0 S.F.	=	0.00 Ac.	0.92
Pavement	=	0 S.F.	=	0.00 Ac.	0.92
Patios	=	0 S.F.	=	0.00 Ac.	0.92
Sidewalks	=	0 S.F.	=	0.00 Ac.	0.92
Cult. Field (0-2'	S.F.	=	0.00 Ac.	0.92	0.02
Cult. Field (2-5%)	155,682 S.F.	=	0.00 Ac.	0.20	0.20
Cult. Field (5-10%)	S.F.	=	3.57 Ac.	0.35	0.20
Cult. Field (>10%)	S.F.	=	0.00 Ac.	0.50	0.20
Water	S.F.	=	0.00 Ac.	0.65	0.20
Misc.	S.F.	=	0.00 Ac.	1.00	0.00
				0.92	0.02

Weighted c =	0.350
Weighted N =	0.200
Sheet Flow	
L =	300 Ft.
H =	10.3 Ft.
S =	0.0343 Ft./Ft.
t1 =	12.30 Minutes
Shallow Concentrated Flow	
L =	57 Ft.
H =	1.3 Ft.
S =	0.0228 Ft./Ft.
v =	2.40 Ft./sec.
t2 =	0.40 Minutes
Open Channel Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.40 Ft./sec.
t3 =	0.00 Minutes
tc =	12.69
I(10) =	4.915 In./Hr.
I(25) =	0.000 In./Hr.
I(50) =	0.000 In./Hr.
I(100) =	0.000 In./Hr.
Q(10) =	6.15 CFS
Q(25) =	0.00 CFS
Q(50) =	0.00 CFS
Q(100) =	0.00 CFS

(Min. 5 minutes)

(From HRPICC Figure 3.4.5)

UNDEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.: UN-2

Total Area = 93,892 S.F.
2.16 Acres

Surface					C	N
Structures	=	0 S.F.	=	0.00 Ac.	0.92	0.02
Drives (Asphalt)	=	0 S.F.	=	0.00 Ac.	0.92	0.02
Drives (Gravel)	=	0 S.F.	=	0.00 Ac.	0.92	0.15
Pavement	=	0 S.F.	=	0.00 Ac.	0.92	0.02
Patios	=	0 S.F.	=	0.00 Ac.	0.92	0.02
Sidewalks	=	0 S.F.	=	0.00 Ac.	0.92	0.02
Cult. Field (0-2'	S.F.	=		0.00 Ac.	0.20	0.20
Cult. Field (2-5%)	93,892 S.F.	=		2.16 Ac.	0.35	0.20
Cult. Field (5-10%)	S.F.	=		0.00 Ac.	0.50	0.20
Cult. Field (>10%)	S.F.	=		0.00 Ac.	0.65	0.20
Water	S.F.	=		0.00 Ac.	1.00	0.00
Misc.	S.F.	=		0.00 Ac.	0.92	0.02

Weighted c =	0.350
Weighted N =	0.200
Sheet Flow	
L =	266 Ft.
H =	4.6 Ft.
S =	0.0173 Ft./Ft.
t1 =	13.64 Minutes
Shallow Concentrated Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.50 Ft./sec.
t2 =	0.00 Minutes
Open Channel Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.40 Ft./sec.
t3 =	0.00 Minutes
tc =	13.64
I(10) =	4.750 In./Hr.
I(25) =	0.000 In./Hr.
I(50) =	0.000 In./Hr.
I(100) =	0.000 In./Hr.
Q(10) =	3.58 CFS
Q(25) =	0.00 CFS
Q(50) =	0.00 CFS
Q(100) =	0.00 CFS

(Min. 5 minutes)

(From HERPICC Figure 3.4.5)

UNDEVELOPED DRAINAGE BASIN CALCULATIONS

Basin No.: UN-3

Total Area = 248,738 S.F.
5.71 Acres

Surface		C	N
Structures	= 0 S.F. = 0.00 Ac.	0.92	0.02
Drives (Asphalt)	= 0 S.F. = 0.00 Ac.	0.92	0.02
Drives (Gravel)	= 0 S.F. = 0.00 Ac.	0.92	0.15
Pavement	= 0 S.F. = 0.00 Ac.	0.92	0.02
Patios	= 0 S.F. = 0.00 Ac.	0.92	0.02
Sidewalks	= 0 S.F. = 0.00 Ac.	0.92	0.02
Cult. Field (0-2')	149,250 S.F. = 3.43 Ac.	0.20	0.20
Cult. Field (2-5%)	99,488 S.F. = 2.28 Ac.	0.35	0.20
Cult. Field (5-10%)	S.F. = 0.00 Ac.	0.50	0.20
Cult. Field (>10%)	S.F. = 0.00 Ac.	0.65	0.20
Water	S.F. = 0.00 Ac.	1.00	0.00
Misc.	S.F. = 0.00 Ac.	0.92	0.02

Weighted c =	0.260
Weighted N =	0.200
Sheet Flow	
L =	300 Ft.
H =	5.8 Ft.
S =	0.0193 Ft./Ft.
t1 =	14.06 Minutes
Shallow Concentrated Flow	
L =	123 Ft.
H =	1.0 Ft.
S =	0.0081 Ft./Ft.
v =	1.60 Ft./sec.
t2 =	1.28 Minutes
Open Channel Flow	
L =	0 Ft.
H =	0.0 Ft.
S =	#DIV/0! Ft./Ft.
v =	2.40 Ft./sec.
t3 =	0.00 Minutes
tc =	15.34
I(10) =	4.486 In./Hr.
I(25) =	0.000 In./Hr.
I(50) =	0.000 In./Hr.
I(100) =	0.000 In./Hr.
Q(10) =	6.66 CFS
Q(25) =	0.00 CFS
Q(50) =	0.00 CFS
Q(100) =	0.00 CFS

(Min. 5 minutes)

(From HERPICC Figure 3.4.5)